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A METHOD AND SYSTEM FOR CHANGING THE SERVICE LEVEL FOR SUBSCRIBERS IN AN ELECTRONIC COMMUNICATIONS NETWORK

5   **Field of the Invention**

The present invention relates to a method and system for changing the service level for subscribers in an electronic communication network.

10   **Description of the Prior Art**

All commercial communications networks, for example mobile telephone communications networks including operators and service providers, have a charging system for charging customers utilising the network and different
15 services.

Today's mobile telephone communications networks such as GSM, public switched telecommunications networks (PSTN), ISDN, ATM, Internet etc. provide many different more or less sophisticated tele and data communications services
20 for users and providers, regional as well as world-wide. The demands for increased benefit of the network operator, the service provider, and the service subscriber have brought forth the concept of Intelligent Network (IN). An Intelligent Network is a telecommunications concept that
25 meets the market demand, from network operators and service providers, for advanced services within the existing telephony network. Examples of such services are Premium Rate calls, Mobile Virtual Private Network, Prepaid charging and Personal Number. Different network providers
30 offer different sets of services including both charged services and services free of charge.

Charging for usage of mobile telephone communications networks such as GSM, public switched telecommunications networks (PSTN), ISDN, ATM, Internet etc. and their
35 associated services are achieved by means of a payment mechanism or service. Both postpaid and prepaid services

are used. On one hand, the service subscriber pays for a
service after it has been used, for example once a month,
in postpaid service. Contrary, in a prepaid service, the
service subscriber or customer pays before the usage of the
5   service.

In prior art pre-paid systems it is common practice
to load an account with money and then deduct the account
balance due to subscriber usage. For an ongoing call, the
account balance is decreased step by step until it is zero,
10   resulting in that the call is cut off and no charged
activity is allowed until the account has been refilled. Of
course it is desired by service providers that subscribers
or users utilise services as much as possible. One part of
achieving this is that service providers give promotions to
15   frequent and large consumers.

In a prior art prepaid system (PPS) provided by the
applicant, the subscriber can receive promotions as money
amounts to be summed to the actual account balance. It is
also possible to add money to sub-accounts dedicated to
20   specific services, e.g a Short Messages sub-account.

This way of handling promotions give some flexibility
but the result of the promotions is always reconnected to
an amount of money to be added to the subscriber
account(s). Also the number of available sub-accounts
25   limits the number of promotions that can be defined.

In this way some very common promotions can't be
offered, in fact whenever the tariff for a service is not a
fixed rate, it is not possible to translate a bonus on that
service, e.g 3 free SMs, to a money amount since the price
30   for that service may vary.

For instance to give "60 minutes of calls towards the
numbers in the area 08" is not possible since these calls
can have different prices in different daytime intervals.
The same reasoning applies to promotions like "10 MB free
35   GPRS download" or "10 bullets for the online game".

Summary of the invention

It is an object of the present invention to provide an improved method for changing the service level for subscribers in an electronic communication network.

Another object of the present invention is to provide an improved method for utilising communication services provided by the communication network.

This object is achieved by a method for changing the service level for a subscriber in an electronic communication network, wherein one or more voucher records are created for one or more services, each record comprising a voucher quantity of vouchers and an identification parameter for association with one or more services, and wherein the one or more records are associated with a subscriber for usage by the subscriber when utilising the services.

A more specific object of the invention is to provide an improved data processing system and a computer program for working the method.

An advantage of the present invention is that promotions not translatable into an amount of money can be added to a subscriber account. Further it is an advantage that operators of communications systems including the method and system according to the invention are capable to offer discounts to their subscribers for a certain time, volume, service or a combination thereof.

It should be emphasized that the term "comprises/ comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Brief Description of the Drawings

In order to explain the invention in more detail and
the advantages and features of the invention, a preferred
embodiment will be described in detail below, reference
being made to the accompanying drawings, in which

5   FIG 1 is a schematic view of a part of a cellular
mobile telephone network,

FIG 2 is a block diagram of an embodiment of a data
structure including a first and a second voucher list
forming a part of a system according to the present

10   invention for changing the service level in a
communications system,

FIG 3 is block diagram of another part of the data
structure in FIG 2 comprising fee and rating leafs
including voucher settings,

15   FIG 4 is a block diagram of the embodiment of the
data structure in FIG 2 including an updated first voucher
list according to the present invention, and

FIG 5 is a block diagram of the embodiment of the
data structure in FIG 2 including also an updated second

20   voucher list according to the present invention.

Detailed Description of the Invention

Referring to FIG 1, there is shown an example of a
communications network such as a cellular mobile telephone

25   network or PLMN (public land mobile network) including a
service providing network, such as an intelligent network
(IN) facilitating service delivery for subscribers
connected to the network. In this embodiment, the network
also provides a real-time charging mechanism and a method

30   for determining rating data for pre-paid services for sub-
scribers in the communications network. The real-time
charging mechanism is only one example of a method for
charging for services in a communications network, but this
mechanism is not necessary for the invention. This real

35   time charging mechanism supports rating and charging of

both prepaid and post paid services. An off-line mechanism
or other method of charging is likewise possible within the
scope of the invention.

5   Cellular telephone service, such as GSM/UMTS,
involves the subdivision of a service area into a number of
smaller cells. Among other components and features, a
cellular mobile communications system or PLMN comprises a
gateway mobile services switching centre (GMSC) 101 and
mobile services switching centre (MSC), which provides
10   specific data about individual mobile phones 102 in the
network and operates as an interface towards other networks
such as other PLMNs, ISDN or a public switched network
(PSTN), represented by a fixed exchange 103 and telephone
set 104 in the communications system. The (G)MSC 101
15   comprises a data processing system, including a computer
processor for processing data, and storage means connected
to the computer processor for storing data on a storage
medium.

      Cellular systems are using radio access based on both
20   analogue and digital transmission. Digital cellular systems
provide the best quality with the least amount of band-
width. Different kinds of principles such as TDMA or CDMA
technologies are used for digital cellular systems, such as
GSM.

25   The communications system also has an intelligent
network IN with a signalling network, which performs
message switching between network elements. In this
embodiment of the invention, a specific type of signalling
protocol, signalling system 7 (SS7), is used as a carrier
30   for the exchange of information messages and carries many
types of information elements, which are useful for
intelligent network services. However, SS7 is only an
example and the signalling protocol can be based on another
protocol such as the Internet Protocol (IP), Camel
35   Application Part (CAP) for GSM/UMTS, IN Application Part

(INAP) for fixed networks - where CAP and INAP are
transported on SS7/C7/SIGTRAN. Additionally, the
intelligent network includes a service switching function
105, a gsm service switching function (gsmSSF) in this
5   embodiment. The SSF 105 is in GSM usually located in the
(G)MSC 101. The SSF 105 detects events indicating a call
requiring IN and after this triggering, it suspends call
processing and starts a series of transactions with a
service control function 106, a gsm service control
10   function (gsmSCF) in this embodiment. Additionally or as an
alternative, the communications system has a service or
gateway GPRS support node 107, including a gprs service
switching function (gprsSSF), for communication with users
of GPRS equipment 107'.
15   The SCF 106 is a real-time service processing system
that, based on a query from the SSF 105, performs
subscriber- or application-specific service logic,
controlling the call set-up and call flow. A home location
register (HLR) 108 stores the identity and user data of all
20   the subscribers belonging to the PLMN. Further, the HLR 108
provides the (G)MSC 101 with the necessary subscriber data
when a call is coming from a public switched network (PSTN)
103,104, an ISDN network, the Internet etc. A visitors
location register (VLR) of the (G)MSC 101 contains relevant
25   data of all mobiles currently located or roaming within a
serving (G)MSC 101. The VLR has to support the (G)MSC 101
during call establishment when a call is coming from a
mobile telephone 102.
        A service data function (SDF) 109 or point is a
30   database containing service data needed for the service,
including for example tariff data, subscriber data, group
data etc. In this embodiment, the SDF 109 or SCF 106 also
handles rating and charging analysis.
        The disclosed embodiment of the communications system
35   according to the invention also includes a TCP/IP network

(Internet) 110, a content server (CS) 111 and at least a
network access server 112 for communication with computer
terminals 113 and their users.

5   Before a mobile telephone user can make a phone call
or use other post or prepaid services provided by the
network and service providers, content provider or value
added service provider etc., hereafter called providers,
he/she has to be registered as a "subscriber".

       As mentioned above, the database of the service data
10   function (SDF) 109 contains service data needed for
services, including for example tariff data, subscriber
data etc in this embodiment.

       One embodiment of a data structure 200 forming a part
of the charging system for changing the service level and
15   utilising communication services according to the invention
is shown in FIG 2. The data structure is stored and handled
by the SDF 109 (and SCF 106) shown in FIG 2.

       A first subscriber 201 is identified by a subscriber
ID (SubID) 201a, for example MSISDN in GSM. A flexible
20   voucher list FVL 202 is associated with the subscriber 201.
The list 202 comprises a sequence of voucher records, in
this example three records 203, 204, 205 including a
voucher type id 203a, 204a, 205a and a voucher quantity Qty
203b, 204b, 205b. Each record in the list has a voucher
25   quantity (Qty) 203b, 204b, 205b of vouchers related to a
specific service identified by the voucher type ids 203a,
204a, 205a, respectively. The first subscriber 201 also has
a unit variable 201b, with a value of 100 units for service
usage in this embodiment of the invention.

30   A second subscriber 211 identified by a subscriber ID
(SubID) 211a, i.e MSISDN=070456, for the purpose of
illustration. The second subscriber 211 has an associated
flexible voucher list FVL 212. The list 212 comprises a
sequence of voucher records, two records 213, 214,
35   including a voucher type id 213a, 214a, and a quantity Qty

213b, 214b. Each record in the list represents a number
(Qty) 213b, 214b, of vouchers related to a specific
service, that is for example the target of a particular
promotion, identified by the voucher type ids 213a, 214a.
5   The second subscriber 211 also has a unit variable 211b,
with a value of 55 units in this embodiment of the
invention.

      Generally, a rating leaf 301 of type "fee" in a
rating tree of the charging system contains a single field:
10   the fee 301a to be applied expressed in units, 20 in this
example. According to the invention, it is extended with
new fields: a voucher type id 301b and a voucher quantity
Qty 301c. These fields, if not empty, specify the type
(voucher type id) and the quantity (voucher quantity) of
15   vouchers corresponding to the fee 301a for a particular
service.

      Further, a rating leaf 302 of type "rate" contains
two fields, an amount or rate 302a to be deducted to rate
an interval (units) and the charging interval 302b to be
20   rated (in seconds). This leaf 302 is extended with new
fields: a voucher type id 302c and a voucher quantity 302d.
These fields, if not empty, specify the type (voucher type
id) and the quantity (Qty) of vouchers corresponding to
the rate for the specified interval.

25   When the charging system analyses the rating tree
including the one or more rating leafs 301, 302 to charge
for a service, the specified amount of units or the
specified voucher quantity according to the contents of the
leafs 301 and 302, respectively are decreased from the
30   subscriber's available units or associated voucher record.

      To leave the voucher section empty in the rate and
fee leafs 301, 302 would mean that no voucher can be used
to pay for the service, but only with available units.

To fill the voucher section while leaving the "fee" or "rate" fields empty in the leafs 301, 302 would mean that the use of the entered voucher types is the only way to charge for that service.

If a subscriber should send an originating SM (Short Message), such as an SMS (Short Message Service), the rating is set with the fee specified in the fee leaf 301. This means that an originating SM can be paid either with 20 account units or with 2 vouchers of type (Id) 7.

Considering the subscribers 201 and 211 in FIG 2, the subscriber 201 with the MSISDN=070123 that has to pay for an originating SM will do that using 2 units of the voucher type id="7". Instead, the subscriber 211 with the MSISDN=070456, not having any voucher type of Id="7", will have his account 211b deducted by 20 units.

The situation after the payment of the fee by the two users is illustrated in FIG 4. The first subscriber 201 has now 1 unit of Qty 205b left of the voucher type id="7" 205a, and the second subscriber 211 has 35 units left.

For originating voice calls towards a B-no. beginning with 08, the rating leaf 302 is used for the rate. This means that one second of call towards "08" can be paid with 1.2 account units 302a or alternatively with 0.3 vouchers 302d of type Id=5 302c.

The subscribers 201 and 211 are in the state specified in FIG 4. Both subscribers make an originating call towards 08 with a deduction time of 10 seconds. The rating of that period would leave the two subscribers in the state specified in FIG 5, i.e the first subscriber 201 has 88 units left and the second subscriber 211 has now 3 units of Qty 214b left of the voucher type id="5" 214a.

The rating function of the service data function (SDF) 109 or SCF is a decision tree that branches on the available input parameters (i.e. the time of the day), where the leafs define the price to pay for the service.

It has the possibility to use the vouchers that are
in the subscriber's FDL 202, 212, instead of the
subscriber's money to pay the requested service.

When a price is determined the (optional) possibility
to use a number of vouchers of a certain Id should be given
in the rating component, i.e the computer program code
means and/or computer hardware means performing the rating
in the system as an alternative option to pay for the
service, instead of the money.

The rating tree leafs could be further enhanced
adding a percentage field to the voucher section (values
from 0% to 100%). This would specify the max. percentage of
the service that is payable using the vouchers.

This extension would make possible promotions like:
"Pay the first 50 SMs with a 50% discount and the rest at
full price" by provisioning 50 vouchers for SMs to the
subscriber with the discount factor set to 50%.

Since the voucher types in the list are identified by
Ids and the binding between the Id and the use of that kind
of voucher, the FVL can be used to promote any service.

E.g. the voucher with Id="1" 203a could be associated
by an operator to "Free SM" and therefore Qty="20" 203b
would represent "20 free SM". Another operator could use
the voucher with Id="1" to identify the "bullets for the
on-line game" and therefore Qty="20" 203b would represent
"20 free bullets". Further, but not limiting, examples of
services that can be promoted by the method according to
the invention are EMS (Enhanced Messaging Services), MMS
(Multimedia Messaging Service), volume of data, time of
service usage or a monetary value etc..

The voucher records could be further enhanced by
adding an expiry date to each voucher record.

In this embodiment of the invention only two
subscribers 201 and 211 have been described. However, the
invention is not limited to two subscribers, but it is

equally applicable to a system with one or more subscribers
A subscriber is linked to an account but an account can be
referred by many subscribers. The FVL, could be provided on
both the account level, i.e it is applicable to all the
5   subscribers linked to that account, and the subscriber
level as well, i.e it is applicable only for that
particular subscriber. If FVL is present at both levels
then the FVL to use would be the one resulting from the
union of the subscriber list and the account list. Vouchers
10   would be deducted from the FVLs starting with the
subscriber list.

Further, each list associated with the subscribers
can comprise one or more records, wherein each record
represents values for individual services. The term list is
15   used herein as a conceptual denomination but the actual
implementation may vary. Normally, a simple table would be
used but other data structures as linked lists, trees etc.
could be used as well.

The method of the present invention is preferably
20   implemented in computer software executable preferably by a
central or distributed data processing system forming part
of the overall communication system for communication with
other devices, components or data processing system/s in
the communications system of the network or networks. In
25   one embodiment of the data processing system, i.e the SCF
106, according to the invention, it comprises a computer
processor for processing data in the operator, and at least
a storage connected to the computer processor for storing
data, such as the database of the SDF 109, on a storage
30   medium. In this embodiment of the invention, the computer
processor of the operator in the network is configured to
work the steps of the method.

Hence, it should be apparent that the present
invention provides an improved method and system for use in
35   an electronic communications system or network, comprising

a rating and charging mechanism that provides an improved
charging system and method for changing the service level
for subscribers in an electronic communication network and
utilising communication services provided by the
5   communication network that fully satisfies the aims and
advantages set forth above. Although the invention has been
described in conjunction with a specific embodiment thereof
this invention is susceptible of embodiments in different
forms, with the understanding that the present disclosure
10   is to be considered as an exemplification of the principles
of the invention and is not intended to limit the invention
to the specific embodiments illustrated.

    Although the method is described in conjunction with
a mobile telephone call in an intelligent/CAMEL network of
15   a mobile communications system, such as GSM, the method is
applicable on any communication session, both terminating
and originating, and other communication services in other
kind of networks. For example, the method and system
according to the invention are applicable in other mobile
20   telephone networks, public switched telecommunications
networks (PSTN), ISDN, ATM, Internet etc., which provide
many different more or less sophisticated tele and data
communications services, such as for users and providers.